Heat Extraction Barrier Pilot Study Data Needs -- Update

Subject: Heat Extraction Pilot Study Updated Data Needs to Adequately Evaluate Potential Effectiveness of Heat Extraction Barrier, West Lake Landfill

Date: October 9, 2105

Purpose:

One of the alternatives evaluated in the October 2014 Isolation Barrier Alternatives Analysis report submitted by Bridgeton Landfill LLC is a heat extraction barrier. However, the Alternatives Analysis report lacked detailed information necessary for USACE to make an independent technical evaluation of the potential effectiveness of such a system. Since the October report was submitted, Bridgeton Landfill LLC proposed to expand on the current test well (GIW-4) and perform a pilot study to obtain information to demonstrate the effectiveness of this proposed alternative and to obtain data necessary for design of the system. It is USACE's understanding that this expansion pilot study was approved by the Missouri Department of Natural Resources (MDNR) and implemented.

In December 2014, USACE submitted to EPA the information listed below. This list is information USACE will need regarding the heat extraction study at GIW-4 and the pilot study expansion system that consisted of retrofitting 6 additional GIW wells with recirculation coolant tubes, to assess whether adequate information is being collected to design an effective heat extraction system.

It is USACE's understanding that the pilot study data that was submitted to the Missouri Department of Natural Resources (MDNR) was posted on their website. USACE reviewed the information posted on the MDNR web site and supplemented the list below with what information was identified from that web page. The supplemental information is included below in brackets with text bolded. If there is no bracketed/bolded information, we could not locate the information.

- Schematic of the modified GIW-4 used in the preliminary heat extraction study including depth and construction of the well and all pipe sizes where fluid is flowing **[MDNR website has a submittal from Republic that shows a schematic of the cooling loop proposed for the expanded pilot. As-built information was not provided]**
- Details of the cooling equipment and/or coolant being used in the pilot study.
- The preliminary data collected from the heat extraction study at GIW-4 including inflow and outflow water temperatures, flow rate, and the temperature within the casing measured at multiple depths.
- Calculations to determine the 25kW extraction rate.

- Location of the 6 additional GIW wells to be retrofitted with recirculation coolant tubes including depth and construction of the wells and all pipe sizes where fluid will flow. **[MDNR website has a Republic submittal requesting expansion of the pilot study and includes a plan view of proposed GIW wells and locations of proposed new temperature probes.]**
- An explanation of how the modified GIW wells are representative of the proposed driven heat extraction wells and whether or not a pilot study of driven wells of the material proposed for the full scale system will be tested prior to design and installation of the system.
- Plans of the proposed closed loop header system used to convey cooling water to the mechanical cooler.
- Location of current Temperature Monitoring Probes and depths and proposed locations and depths of temperature measurements when the pilot study is expanded.
- Proposed study procedures including assumptions used.
- Proposed calculations to determine thermal conductivity and heat storage properties of the landfill waste. In addition, how is obtaining thermal conductivity and heat storage properties of the South/North Bridgeton landfill waste representative of these properties in the proposed location of the heat extraction system in the West Lake Landfill waste?
- Results of the assessment of heat front progress to the north and the rate of energy flux to the north.
- Calculations used to predict the amount of heat that could be extracted under steady state conditions and the results of those calculations.
- A plan view of the proposed Temperature Monitoring Points as well as a cross section showing depth intervals of temperature readings. Attachment C indicates it is envisioned as one array per 120 feet would be sufficient. Is this 120 ft spacing parallel with the proposed barrier? [**[MDNR website has a Republic submittal requesting expansion of the pilot study and includes a plan view of proposed GIW wells and locations of proposed new temperature probes.]**
- It appears the settling front associated with the SSE would render the heat exchange system non-functional if the system fell within the influence of settlement (similar to the need to set back Option 3 IB wall). Therefore, it appears the heat exchange system would need to halt the SSE and settling front some distance south of the barrier to prevent this failure from occurring. What distance is this and what temperature needs to be attained some distance from the barrier to prevent this from happening?

On October 8, EPA notified USACE that Republic Services had provided them with more details of the cooling system. Once that information is provided, USACE will review that information and provide further updates, as required, on what additional information is necessary to evaluate the cooling loop pilot with the potential of utilizing it as a thermal barrier option for the isolation barrier.

If you have any questions, please contact me at 816-389-3615.

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